

## **Exhibit H**



## Original Contribution

# Impact of conducted electrical weapons in a mentally ill population: a brief report

Jeffrey D. Ho MD<sup>a,\*</sup>, Donald M. Dawes MD<sup>b</sup>, Mark A. Johnson BS<sup>c</sup>, Erik J. Lundin<sup>c</sup>, James R. Miner MD<sup>a</sup>

<sup>a</sup>Department of Emergency Medicine, Hennepin County Medical Center, Minneapolis, MN, USA

<sup>b</sup>Department of Emergency Medicine, Lompoc District Hospital, Lompoc, CA, USA

<sup>c</sup>Division of Medical and Technical Research, TASER International, Scottsdale, AZ, USA

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### Abstract

**Introduction:** Conducted electrical weapons (CEWs) are used by some law enforcement agencies to subdue mentally ill subjects who are combative, violent, or suicidal. The use of CEWs in this population is controversial. Proponents advocate CEW use to avoid other forms of escalated force. Opponents advocate against CEW use because of the potential for abuse. What is lacking in the medical literature is documentation of the impact on outcome that this technology may have when used in this population. This project represents an initial report in this area.

**Methods:** A database of CEW use has been maintained since 1999 to which law enforcement agencies voluntarily report. This database was reviewed for occurrences of CEW use on mentally ill and suicidal subjects. Situation outcome and potential for law enforcement use of deadly force as an alternative were recorded. Data analysis was performed using descriptive statistics.

**Results:** There were 10 608 reports of CEW use over a 72-month period. Of these, there were 2452 uses on mentally ill subjects; and of these, 1111 (45.3%) were in situations where lethal force by the law enforcement agency would have been justified or where the subject represented an imminent life threat to himself.

**Conclusion:** The mentally ill represents a significant portion of subjects upon whom CEWs are used. These data suggest frequent use of CEWs in situations where deadly force would otherwise be justified and in situations where subjects exhibit imminent danger to themselves. These data also suggest that escalation to deadly force was avoided in many mental illness and suicidal situations by the presence of a CEW.

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## 1. Introduction

Conducted electrical weapons (CEWs) are becoming increasingly popular with law enforcement agencies in the

United States. They are used by law enforcement officers (LEOs) to subdue persons who are combative, violent, mentally ill, or suicidal. There are examples around the country of special mental health or crisis intervention units within police departments that have CEWs in their armamentarium of options for dealing with mentally ill or suicidal subjects [1].

\* Corresponding author.

The use of CEW in the mentally ill population is controversial. In the recent past, there have been cases of mentally ill persons exhibiting agitated, violent states who have died because the police lacked specific tools or training to deal with this population [2]. Much of the controversy is based on nonscientific death tabulations or speculation [3,4]. Most of these deaths are eventually found to be due to factors other than the CEW such as drug intoxication or underlying cardiac disease. This is consistent with previous medical literature [5]. These deaths have exhibited consistent trends of behavioral patterns just before death that include bizarre actions and incoherence. This behavior has been documented and is often referred to in the literature as *excited delirium* [6,7]. In addition, certain uncontrolled mental illnesses seem to have a high correlation with this type of behavior and specifically have been described to be fatal in the literature as far back as the 1800s [8]. This type of death in the mentally ill population obviously occurred long before the invention of the CEW. What is not documented today is what effect on outcome the CEW may have on this population.

There are also many documented cases of suicidal persons engaging LEOs with the sole purpose of creating a situation of LEO-assisted suicide, also known as the *suicide by cop* phenomenon [9,10]. Proponents of CEWs advocate use to avoid other forms of escalated force or to prevent suicide. In many situations, it is believed that the presence and use of a CEW have resulted in the avoidance of deadly force and unnecessary officer or subject injury [11]. Opponents advocate against CEW use because it has a potential for abuse and may make it easier for law enforcement to avoid using lesser amounts of force or verbal dialogue [12,13]. There have been no reports in the medical literature on the impact that this technology may have on outcomes when applied to the mentally ill and suicidal population. This project represents an initial investigation into this area. The primary objective of this study was to examine what effect CEW use has had on final outcome in this population after an agitated or potentially violent interaction with law enforcement.

## 2. Methods

Conducted electrical weapon manufacturer TASER International (Scottsdale, AZ) has maintained a voluntary, self-reporting database for CEW use in the field since 1999. Eligible reporters to this database include any law enforcement agency in the United States using CEWs. This database contains numerous descriptors of each reported CEW use including narratives of law enforcement contact circumstances, subject mental health conditions, whether lethal force could have been legally justifiable as determined by the reporting officer based on individual department policy, or whether the subject was suicidal and posed an imminent and potentially lethal danger to himself. Reporters

to this database are specifically asked to comment on these descriptors in the narrative section of the database.

This database was retrospectively reviewed for this project. A single reviewer was used to maintain evaluative consistency. The reviewer was not blinded to the purpose of this study and had been trained to look for clues of subject mental illness in these reports. These clues included LEO use of the words *psychiatric*, *mental*, *agitated*, *crazy*, *suicide*, and *bizarre*. The reviewer was also trained to look for mention of medication or behavioral actions that would be considered bizarre and out of the ordinary given the context of the encounter. Each report had an option to be designated specifically as an interaction with a known, mentally ill subject. The reviewer initially filtered the data by including only those reports that had this designation. From the remaining reports, the narratives were reviewed for the clues described above. If there was a question, the report was referred to one of the principle investigators for a decision on inclusion.

A standardized abstraction collection format was used. In situations where the report seemed incomplete, additional attempts were made by the authors to obtain more information about the report. These attempts included contacting the reporter or the reporter's agency. If information remained unclear or unavailable after these attempts, the report was excluded from the data. The authors were given unrestricted access to the database, and this project was approved as an exempt study by the Hennepin County Medical Center's human subjects research committee before initiation.

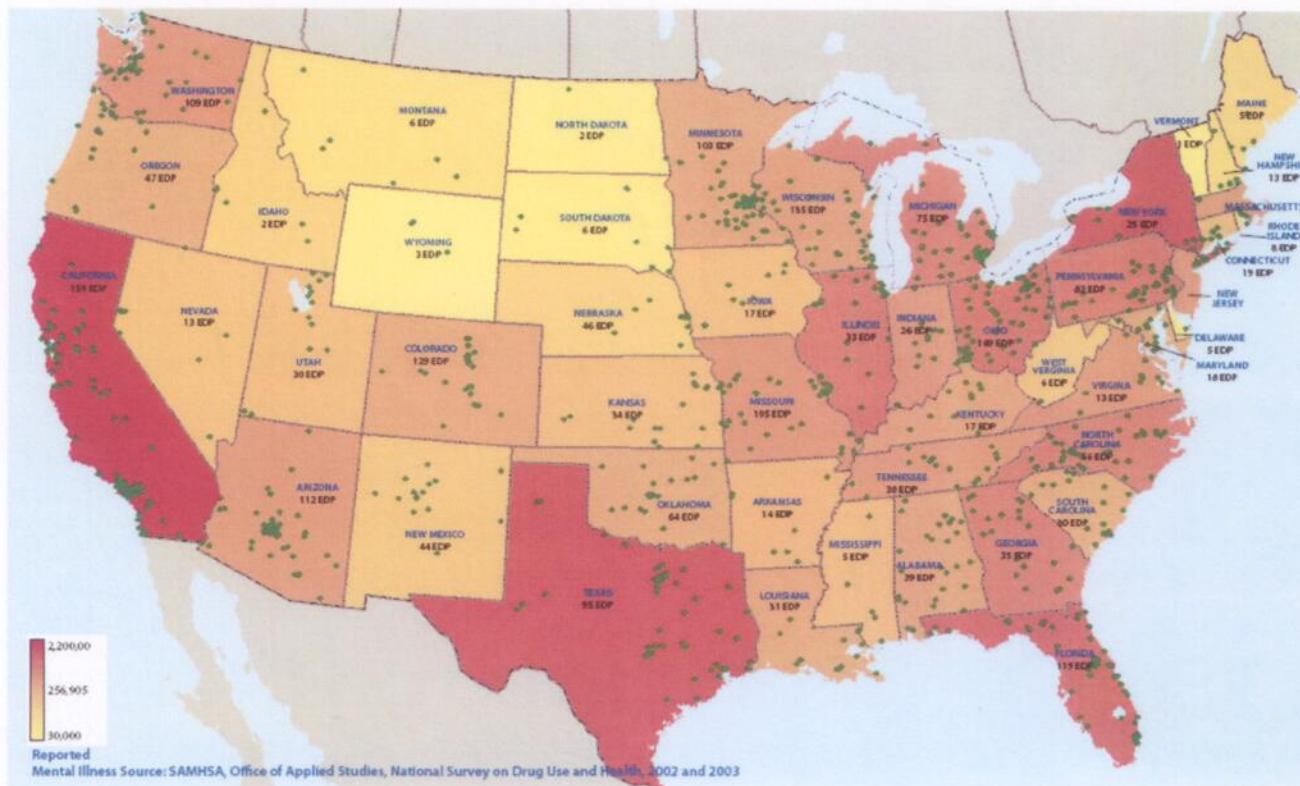
There were 72 months of data available for review. The data were reviewed specifically for indicators of mental illness in the encountered subject. This population was further investigated for evidence of suicidality. These cases were tabulated, and the variable of whether or not lethal force by the LEO would have been justified was specifically examined.

In evaluating the data set for indicators of mental illness, we specifically counted the cases where the "subject mentally ill" box was checked by the reporting LEO. In addition, we read through individual narratives and included cases where the narrative confirmed the presence of a mental illness condition, the need for the subject to be on mental health medications, or behavior that was bizarre enough that could not be explained by any other factor such as illicit drug use. In circumstances where we were unsure, individual LEOs or their agencies were contacted to verify the accuracy of this information.

Descriptive statistics were applied as appropriate, and a plot map of reported uses was generated (Fig. 1).

## 3. Results

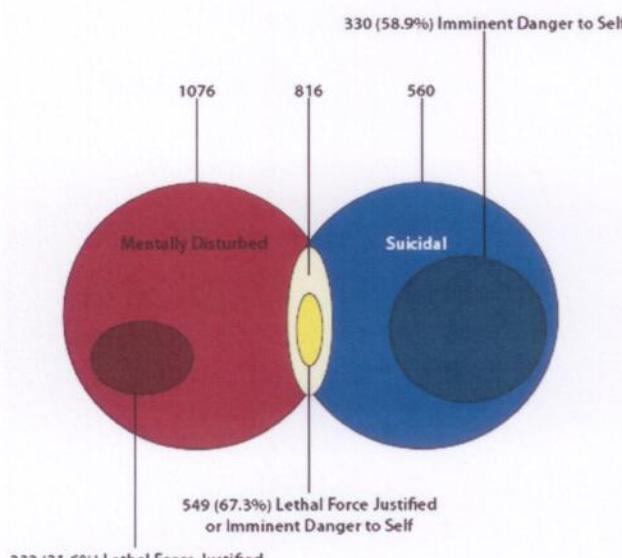
There are 17784 police agencies in the United States [14], and 6137 (34.5%) are included in the database (police



**Fig. 1** Plot map of reported CEW uses on mentally ill subjects from 1999-2005. (Map legend represents population number of reported persons per state with moderate to severe mental illness).

agencies using CEWs). Conducted electrical weapon uses were reported by 1391 individual police agencies (7.8% of total police agencies, 22.7% of agencies that use CEWs included in the database). There were 10608 episodes of CEW use reported over a 72-month period (1999-2005). Of these reported uses, 2452 were categorized as uses on

mentally ill subjects. The mean age of these subjects was  $30.3 \pm 4.6$  years, 16.2% were female, and the mean weight was  $91.7 \pm 9.8$  kg. Substance use was described in 30.4% of cases: 26.8%, alcohol; 3.2%, cocaine; and 0.4%, phencyclidine. Of the 8156 patients who were not described as mentally ill, the mean age was  $30.8 \pm 3.7$  years, 7.0% were female, and the mean weight was  $99.2 \pm 7.3$  kg. Substance use was described in 58.6% of cases: 51.3%, alcohol; 3.8%, cocaine; and 0.5%, phencyclidine. These categorized uses were either indicated as such by the LEO or categorized as such by one of the authors after further investigation of the report. Among the 2452 cases designated as occurring in mentally ill subjects, 1111 (45.3%) were in situations where lethal force by the LEO would have been justified or where the subject was suicidal and represented an imminent life threat to himself (Fig. 2).



**Fig. 2** Venn diagram of included data.

#### 4. Discussion

The predominant CEW technology in use in the United States today is a device known as the *TASER*. The term *TASER* is an acronym for the Thomas A Swift Electric Rifle that was conceptualized in an early 20th century series of children's novels that focused on technology. The TASER CEW operates by using compressed nitrogen to fire 2 metallic darts up to a maximum of 35 feet with a predetermined angled rate of spread. These darts remain tethered to the main

unit that generates a high-voltage, low-amperage electrical current to be delivered into the targeted subject. When the darts make adequate contact and are of adequate separation, it causes involuntary contractions of the regional skeletal muscles that render the subject incapable of voluntary movement. If the darts are fired at very close range and do not achieve adequate separation, full muscular incapacitation may not be achieved; and the device is then used to encourage certain behavior through pain compliance.

Conducted electrical weapons are considered to be an intermediate weapon by law enforcement agencies (intermediate weapons are those devices that generally can induce subject compliance because of pain or incapacitation and are a level above empty hand control techniques, such as joint locks, but less than deadly force). Examples of intermediate weapons include devices such as aerosolized chemical irritants, impact batons, and projectile beanbags.

The CEW is becoming a very popular law enforcement tool, and a manufacturer of this technology reports an approximately 30% penetration into the American law enforcement market [15]. Conducted electrical weapons are considered to be nonlethal weapons under the definition set forth by the United States Department of Defense [16].

Opponents of CEW use in the mentally ill population have cited a lack of safety data related to use on human subjects [12]. Some groups have opposed CEW use on mentally ill persons because they believe they are being unfairly emphasized as targets for use of this technology [13]. In certain cases, there have been suggestions that CEW devices are contributing directly to sudden, in-custody death (ICD) events [17]. It is beyond the scope of this article to fully discuss the theories and areas of research related to ICD events. However, it is fair to say that there are medical studies in the literature that do not implicate CEW devices as a cause of any of the known or accepted methods of sudden death [18-21].

There have been a number of special law enforcement programs started around the country that seek to train LEOs to specifically handle mentally ill subjects [1,22,23]. These programs train LEOs in early recognition of mental illness presentations, de-escalation techniques, and use of nonlethal force options such as CEWs for control of agitation and violent behavior. These programs exist based on the belief that this type of comprehensive approach will result in the saving of human lives in situations where interaction with an uncontrolled, mentally ill subject is necessary. The CEW is generally considered to be a key force option in this type of program. The obvious inference of this is that without this option, LEOs may be required to use a higher force option, up to and including deadly force.

A point of importance for this project is simply to describe outcomes when CEWs are applied within the mentally ill population. A specific subset of this population is composed of those that are acutely suicidal. There are cases described not infrequently where mentally ill persons are engaged in violent or suicidal behavior and LEOs are called upon to deal

with them. Because these encounters may escalate in violence, LEOs have very few options with which to deal with these. In addition, in some cases, the acutely suicidal subject poses an imminent life threat to themselves; and approaching the subject to prevent further harm poses an unacceptable risk to the LEO in the field. Furthermore, there is a subset population that seeks to force the LEO into assisting them with their suicidal intent by presenting themselves to the LEO as imminently able to inflict great bodily harm upon them. This suicide by cop phenomenon is of real concern to LEOs and medical authorities and has been well documented in the literature [10].

In our project, deadly force would have been justified in almost 50% of the reported encounters during the study period if not for the presence of a CEW. We believe that this demonstrates a significantly positive outcome that translates to more than 1100 lives potentially saved over a 6-year period. We also believe this figure to be artificially low because the database only captured voluntary reports. It is important to point out that in the cases reviewed for this study, there is no guarantee that the event would have gone on to end with a deadly force encounter; but the point is that deadly force would have been a legally justified and allowable option to the LEO in these situations.

It is important to provide some description of the database that this project was based upon. This database is maintained by a CEW manufacturer that reports a user base of approximately 30% of the municipal, county, and state law enforcement market [15]. It is reported that there are approximately 17784 of these agencies in the United States [14]. The database contains 34.5% of these that own at least 1 CEW in their armory inventory, although they may not necessarily be deployed in the field. An example of this would be an agency that is independently testing the CEW before considering its use. Of these, 1391 agencies (22.7%) reported into the database regarding use of these devices in the field. It is from these 1391 agencies that this report has been based upon.

We also considered if there was a correlation with mental illness and death when a CEW was used. In the database used for this project, there were no reported deaths. However, we searched a separate database (ICD database) that houses information on sudden ICDs that occur within the United States to further examine this issue [24]. The ICD database has ongoing data collection and uses a prospective, open-source research method. A Web-based media search service ([www.webclippings.com](http://www.webclippings.com)) is used and reportedly scans more than 1.5 billion media sources daily for the intended search criteria. The following search terms are used and tried individually and in combination: *in-custody death, police dies, sheriff dies, law enforcement dies, police kill, sheriff kill, law enforcement kill, police, custody, dies, death*. The gathered data are forwarded electronically and filtered for applicability to this project. Each data entry is evaluated to ensure that duplicate findings are only counted as a single event.

Currently, this ICD database houses more than 800 incidents of ICDs. After filtering the data for applicability, the following was obtained: There were 36 subjects in whom a CEW was used where the subject fit the profile of a person that was mentally ill and where the person died sometime within 72 hours after CEW application. In looking at the 36 subjects that died after CEW application, the authors reviewed additional data including medical examiner reports, law enforcement reports, witness statements, and media accounts to confirm the mental illness profile. Law enforcement officers report that in 32 of the 36 deaths, the CEW had no effect on the subject; and this was primarily due to failure to deliver CEW current (eg, a target miss or very thick clothing.) In 33 of the 36 cases, the CEW was cleared by the medical examiner as not being the primary cause of death. Commonly listed primary causes of death included illicit drug intoxication, excited delirium, exhaustive mania, and underlying cardiac disease. In the remaining 3 cases, no primary cause of death has yet been made publicly available. The ICD database does not seem to support a connection between CEW use in mentally ill persons and their subsequent death.

## 5. Limitations

A limitation to this study is that it represents data that are voluntarily self-reported. This has the potential for bias in that interested parties may have been more motivated to report CEW use. This could result in a skewing of the data. However, there is no other database known to the authors that collects the same type of information; and therefore, it represents the full extent of the currently known data on this topic and is worthy of presentation to the medical community for further discussion.

The retrospective nature of this review is another limitation to be aware of. Conclusions from these data are only as strong as the data that were initially recorded. Although there may be some inherent inaccuracy in this method of study, we believe that there is a lesson to be learned from this unique data set. Our goal for the medical community with this study is to encourage educated debate.

A further limitation of the study is that we only selected subjects that were designated in our review process as mentally ill. We did not look at the entire population and do not know if the results would have been different if we had looked at the general population of subjects in the database. We felt, however, that given the inherent weakness of a self-reported database and given that the need for the use of weapons by LEOs is so broad, the use of CEWs on mentally ill patients would generate a population that could be described as a single group in a generalizable fashion. Given this, our results can only be applied to CEW use among the mentally ill.

A final limitation to consider in this report is the size and scope of the database that was reviewed. In 2000, there were approximately 17 800 state and local registered

law enforcement agencies in the United States [14]. The database reviewed for this project showed 1391 (approximately 8%) agencies to be represented. We believe that the lower number of reporting agencies is representative of the fact that only about 30% of law enforcement agencies have CEWs in their armory inventory [15] and because the reports into this database are not mandatory.

## 6. Conclusions

In this review of voluntarily submitted data, we have demonstrated that CEW availability and use may prevent an escalation to the level of LEO deadly force or successful suicide in encounters with mentally ill subjects. Although this report is a preliminary look into this area and is subject to data collection limitations, we believe that the initial findings offer noteworthy information. We recommend that further study be done in this area to better understand how this emerging technology impacts our society.

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